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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/527,347	03/10/2005	Derek John Fray	R.G.106	7234

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EXAMINER	
SALZMAN, KOURTNEY R	
ART UNIT	**PAPER NUMBER**
1795	

NOTIFICATION DATE	DELIVERY MODE
05/05/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

euspto@slspatents.com

Office Action Summary	Application No.	Applicant(s)	
	10/527,347	FRAY ET AL.	
	Examiner	Art Unit	
	KOURTNEY R. SALZMAN	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 March 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,6,9-21 and 29-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,6,9-21 and 29-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on March 17, 2010 has been entered.

Response to Amendment

2. The amendment filed with RCE has been entered.

3. Claims 1, 6, 9, 15, 17, 18 and 21 have been amended. Claims 5, 7 and 8 have been cancelled. Claims 30 and 31 have been added.

4. Claims 1-3, 6, 9-21 and 29-31 are currently pending and have been fully considered.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1-3, 6, 9-21 and 29-31 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The independent claims listed in the above rejection statement are indefinite as they fail to make clear the amount of oxygen which is truly desired in the sensing

apparatus claimed. These are relative terms to define the oxygen content and the specification gives no further clarification as to how to determine the appropriate amount of oxygen absent a bulk oxygen content at the beginning of assembly, not that of the finished sensor. It is unclear as to if this is the same amount of oxygen which will be needed following processing or that amount will change. Furthermore, the specification also does not lend clarification to determining the oxygen concentration when it is indefinite as to if oxygen is the only species present which causes the final product to form as intended. With this most recent amendment which stipulates the amount of hydrogen to be known, it is clear it is not just the oxygen content prior to forming alone which is to be of use in forming the standard as intended, yet this is not made clear in the claim. It is entirely indefinite as to how the oxygen amount changes or fluctuates between the bulk oxygen reading at assembly and that of the functioning sensor. It is due to these indefinite aspects of the invention in the specification that the claims can not be interpreted in a clear and definite way. To be clear, with respect to the oxygen level, whether or not the oxygen level is known or not does not further define the apparatus unless the claim explicitly defines a level of oxygen in question. In addition, it is unclear even to what extent the oxygen content or distribution of the present invention is known at all as the examiner sees no evidence that the applicant actually measured the oxygen concentration levels of its metal/hydrogen reference standard. The only thing relating to a known level of oxygen was the known oxygen content of one of the starting

materials (but not the other materials) prior to the firing of that material at 940 °C in a hydrogen atmosphere (page 13, lines 11-22). It is unclear how the oxygen concentration of one of the starting materials prior to a high temperature firing in a reducing gas correlates to knowledge of the oxygen concentration of the final metal/hydrogen reference standard. Moreover, if this is the standard for what constitutes a known oxygen concentration, because most metal manufacturers will presumably report impurity concentrations of its metal, including the concentration of oxygen, then the oxygen content or distribution in all standards would also have thereby been known by simply looking at the material data sheet for its purchased metal. Again, in the absence of a particular set forth level of oxygen that differentiates the present invention from the prior art, the oxygen content or distribution limitations cannot define a difference over the teachings applied below. This is the same argument, with regard to how the level of oxygen can be known, which has been submitted to the applicant previously in the previous rejection yet was not addressed in the arguments.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

8. Claims 1-3, 6, 9-12, 17-21, 30 and 31 are rejected under 35 U.S.C. 102(a) as being anticipated by SCHWANDT et al (C. Schwandt, D.J. Fray, M.P. Hills, M.A.

Henson, R.M. Henson and C. Powell, 6th International American Foundry Society Conference, Orlando, FL, 2001. American Foundry Society)

Regarding claims 1 and 30, SCHWANDT et al teaches a hydrogen sensor for use in molten aluminum and its alloys in the abstract. The second full paragraph in the section titled “The Novel Hydrogen Analyser”, the sensor is said to have a perovskite electrolyte in conjunction with a zirconium/hydrogen mixture, operating at a temperature above 550 degrees Celsius. A seal is shown to be used in figure 1. SCHWANDT et al teaches in the second paragraph of section “The novel Hydrogen Analyser” for two phases of β and δ zirconium will be present. Since these two phases will be present, it is inherent the necessary amount of hydrogen is sufficiently present. Since SCHWANDT et al discloses a fully functioning sensor (see fig. 1 and 3), the content of oxygen in SCHWANDT et al is such that the solid electrolyte is substantially chemically stable giving the claim language its broadest reasonable interpretation. With respect to the oxygen level being sufficiently oxygen rich at the surface and or for the oxygen activity to be sufficiently low that the two phases of the metal/hydrogen solution are retained during use of the apparatus to measure hydrogen concentration, whether or not the oxygen level is known or not does not further define the apparatus unless the claim explicitly defines a level of oxygen in question. In addition, it is unclear even to what extent the oxygen content or distribution of the present invention is known as the examiner sees no evidence that the applicant actually measured the oxygen concentration levels of its metal/hydrogen reference standard. The

only thing relating to a level of oxygen was the known oxygen content of one of the starting materials (but not the other materials) prior to the firing of that material at 940 °C in a hydrogen atmosphere (page 13, lines 11-22). It is unclear how the oxygen concentration of one of the starting materials prior to a high temperature firing in a reducing gas correlates to knowledge of the oxygen concentration of the final metal/hydrogen reference standard. Moreover, if this is the standard for what constitutes a sufficient oxygen environment or sufficient oxygen presence, because most metal manufacturers will presumably report impurity concentrations of its metal, including the concentration of oxygen, then the oxygen content or distribution in SCHWANDT et al would also have thereby been inherently sufficient to fulfill the requirements of the instant application by simply looking at the material data sheet for its purchased metal. Again, in the absence of a particular set forth level of oxygen that differentiates the present invention from the prior art, the requirements for a sufficient “oxygen-rich layer at the surface” and wherein “oxygen activity is sufficiently low that the two phases" are retained cannot define a difference over the teaching of SCHWANDT et al. Since the use of the sensor is taught to occur with two phases, it is inherently sufficient that the two phases will exist in SCHWANDT et al as in the instant application.

Regarding claims 2 and 3, SCHWANDT et al teaches a calcium zirconate partially substituted or doped in the second paragraph of the section "The Novel Hydrogen Analyser".

Regarding claim 6, in the second paragraph of section "The novel Hydrogen Analyser" the two phases of β and δ zirconium will be present.

Regarding claims 9-10, when heated the zirconium hydride of the reference standard will react with any oxygen present at the interface between the electrolyte and electrode, forming various oxide layers at the surface. Prevention of the reaction of the solid electrolyte and the reference is a key to the stable operation of the sensor and maintaining a known hydrogen partial pressure as addressed in the section "The Novel Hydrogen Analyser".

Regarding claims 11 and 12, figure 1 shows a platinum coating and are described in the second paragraph of section "The Novel Hydrogen Analyser".

Regarding claims 17 and 18, the same apparatus is created regardless of which order the steps are performed. Therefore, since these are apparatus claims, the stable finished sensor of SCHWANDT et al fulfills these claims. Moreover, the Introduction and "The Novel Hydrogen Analyzer" sections sufficiently describe assembly.

Regarding claim 19 and 20, the first paragraph of the section titled "Measurements and Results" teaches these steps including the preconditioning or "routine check" of SCHWANDT et al.

Regarding claims 21 and 31, SCHWANDT et al teaches a hydrogen sensor for use in molten aluminum and its alloys in the abstract. The second full paragraph in the section titled "The Novel Hydrogen Analyser", the sensor is said to have a perovskite electrolyte in conjunction with a zirconium/hydrogen mixture, operating at a temperature above 550 degrees Celsius. A seal is shown to be used in figure 1. SCHWANDT et al teaches in the second paragraph of section "The novel Hydrogen Analyser" for two phases of β and δ zirconium will be present. Since these two phases will be present, it is inherent the necessary amount of hydrogen is sufficiently present. Since SCHWANDT et al discloses a fully functioning sensor (see fig. 1 and 3), the content of oxygen in SCHWANDT et al is such that the solid electrolyte is substantially chemically stable giving the claim language its broadest reasonable interpretation. With respect to the oxygen level being sufficiently oxygen rich at the surface and or for the oxygen activity to be sufficiently low that the two phases of the metal/hydrogen solution are retained during use of the apparatus to measure hydrogen concentration, whether or not the oxygen level is known or not does not further define the apparatus unless the claim explicitly defines a level of oxygen in question. In addition, it is unclear

even to what extent the oxygen content or distribution of the present invention is known as the examiner sees no evidence that the applicant actually measured the oxygen concentration levels of its metal/hydrogen reference standard. The only thing relating to a level of oxygen was the known oxygen content of one of the starting materials (but not the other materials) prior to the firing of that material at 940 °C in a hydrogen atmosphere (page 13, lines 11-22). It is unclear how the oxygen concentration of one of the starting materials prior to a high temperature firing in a reducing gas correlates to knowledge of the oxygen concentration of the final metal/hydrogen reference standard. Moreover, if this is the standard for what constitutes a sufficient oxygen environment or sufficient oxygen presence, because most metal manufacturers will presumably report impurity concentrations of its metal, including the concentration of oxygen, then the oxygen content or distribution in SCHWANDT et al would also have thereby been inherently sufficient to fulfill the requirements of the instant application by simply looking at the material data sheet for its purchased metal. Again, in the absence of a particular set forth level of oxygen that differentiates the present invention from the prior art, the requirements for a sufficient "oxygen-rich layer at the surface" and wherein "oxygen activity is sufficiently low that the two phases" are retained cannot define a difference over the teaching of SCHWANDT et al. Since the use of the sensor is taught to occur with two phases, it is inherently sufficient that the two phases will exist in SCHWANDT et al as in the instant

application. The application of the voltage to the sensor is discussed in the section regarding "Measurements and Results".

Claim Rejections - 35 USC § 103

9. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

10. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over SCHWANDT et al (C. Schwandt, D.J. Fray, M.P. Hills, M.A. Henson, R.M. Henson and C. Powell, 6th International American Foundry Society Conference, Orlando, FL, 2001. American Foundry Society), in view of KIODE et al (US 5,445,725).

Regarding claim 13, SCHWANDT et al doesn't teach the specific material used to create the cavity discussed for packing the counter reference electrode.

KOIDE et al discloses the use of a glass sealing material for use to keep the reference electrode sensor gas tight as disclosed in column 6, lines 53-57.

At the time of the invention, it would have been obvious to utilize the sealant of KOIDE et al for the detection sensor of SCHWANDT et al because both seek to create an air tight seal and use of the sealant of KOIDE et al in the sensor of SCHWANDT et al will cause the same predictable result of air tight sealing as in use in KOIDE et al.

11. Claims 14 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over SCHWANDT et al (C. Schwandt, D.J. Fray, M.P. Hills, M.A. Henson, R.M. Henson

and C. Powell, 6th International American Foundry Society Conference, Orlando, FL, 2001. American Foundry Society) and KOIDE et al (US 5,445,725) as applied to claim 13 above, as evidenced by FERRO ("Electronic and Specialty Glass: Low Temperature Sealing." Ferro Corporation. 2008. 11 Apr. 2008 <http://www.ferro.com/our+products/electronic/products+and+markets/electronic+and+specialty+glass/low-temperature+sealing.htm>.)

KOIDE et al teaches the use of a glass sealant to create the air-tight sensor of SCHWANDT et al and discloses all the necessary elements of claims 1 and 13.

The combination of KOIDE et al and SCHWANDT et al does not teach the use of a specific type of glass.

There are a very large number of low temperature sealant products evidenced by the Ferro Corporation extensive list shown including product EG 2759 which is used with glass substrates like that of the sensor tubing. This sealant, as shown in the information regarding the product, functions as a glass sealant containing no silicon and borate, a boron oxide, with a low temperature. These types of sealants are very common in the industry and is just one example of those offered by one company. Regarding claim 29, it would have been obvious to one of ordinary skill in the art to select a sealant with a melting temperature lower than 1200 degrees Celsius because the current operation of the sensor is only

up to 800 degrees Celsius, therefore a melting temperature higher than that is unnecessary.

At the time of invention, it would be obvious to use the sealant of the FERRO Company as a substitute for the glass sealant used in the combination of KOIDE et al and SCHWANDT et al because the simple substitution of materials which function the same way would create a predictable result.

12. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over SCHWANDT et al (C. Schwandt, D.J. Fray, M.P. Hills, M.A. Henson, R.M. Henson and C. Powell, 6th International American Foundry Society Conference, Orlando, FL, 2001. American Foundry Society) and KOIDE et al (US 5,445,725) as applied to claim 13 above, and further in view of BODE (US 4,174,258).

KOIDE et al teaches the use of a glass sealant to create the air-tight sensor of SCHWANDT et al and discloses all the necessary elements of claims 1 and 13.

The combination of KOIDE et al and SCHWANDT et al does not teach the use of a protective film, or inert packing, within the sensor.

BODE teaches an electrolyte gas sensor which uses a protective means 13. Figure 2 shows the protective means to fill the balance of the sensor. BODE teaches the protective material to contain oxide metals including that of yttrium. (c. 4, l. 4-19) BODE shows the protective member to be a liner or located inside

the sensor chamber, therefore between the inside or electrode member of ALBERTI et al and the sealant disclosed on the outside of the electrode of KOIDE et al.

At the time of invention, it would be obvious to fill the sensor chamber, as disclosed in BODE, in the sensor as disclosed by SCHWANDT et al and KOIDE et al because the material is used to maintain a constant partial pressure of gas within the sensor chamber (c. 4, l. 1-3), just as is required by an effective reference electrode through constant partial pressure.

Response to Arguments

13. Applicant's arguments filed March 17, 2010 have been fully considered but they are not persuasive.

a. Applicant argues on pages 7 and 8 of the remarks that the information disclosed in SCHWANDT et al does not address the oxygen content of the reference material and provides little information regarding the reference material itself.

i. The examiner was clear in the previous action when addressing the interpretation of the reference for the oxygen which is developed and the stability of the reference. The information is not found expressly in the reference but is inherent to the material and sensor of SCHWANDT et al, as the specification and these arguments provided do not provide state that there is anything different in the conditions of the instant application.

Moreover, since a stable, successful two stage metal hydrogen sensor is created, it is unclear how the applicant alleges their own work is different from that claimed within the application. Please see the above rejections to make clear the intentions of the rejection.

ii. Moreover, the claimed limitations relevant to the new limitations are all relative and this indefiniteness is also addressed above.

iii. Applicant's arguments seem to amount to allegations of patentability without the support. Merely stating that the reference doesn't teach the aspects of the claim does not address the arguments put forth by the examiner in the last action.

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KOURTNEY R. SALZMAN whose telephone number is (571)270-5117. The examiner can normally be reached on Monday to Thursday 6:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nam X Nguyen/
Supervisory Patent Examiner, Art Unit 1753

krs
5/3/2010